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GB A 2112291
GB 1317529
GB 1191182
GB 1074396
GB 1019937
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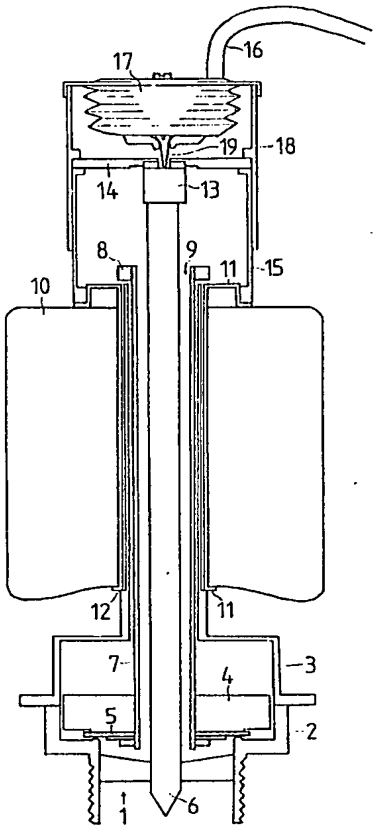
F2V

(54) Fluid control valve

(57) The invention provides a fluid control valve in which a biassing means such as a float 10 urges the valve 4 to the open or closed position, depending on the application of the valve, and is normally overridden by a restraining means 13, 14, the valve further including a control 16-19 by means of which the effect of the restraining means can be broken so that the biassing means can open or close the valve. The restraining means may be a magnet which holds the valve open or closed against the force of the float until its hold is forcibly broken by the control. The control may be pneumatic and may be operated remotely from the valve *eg* when used in a cistern, it may be operated by opening a door or by a floor pressure plate.



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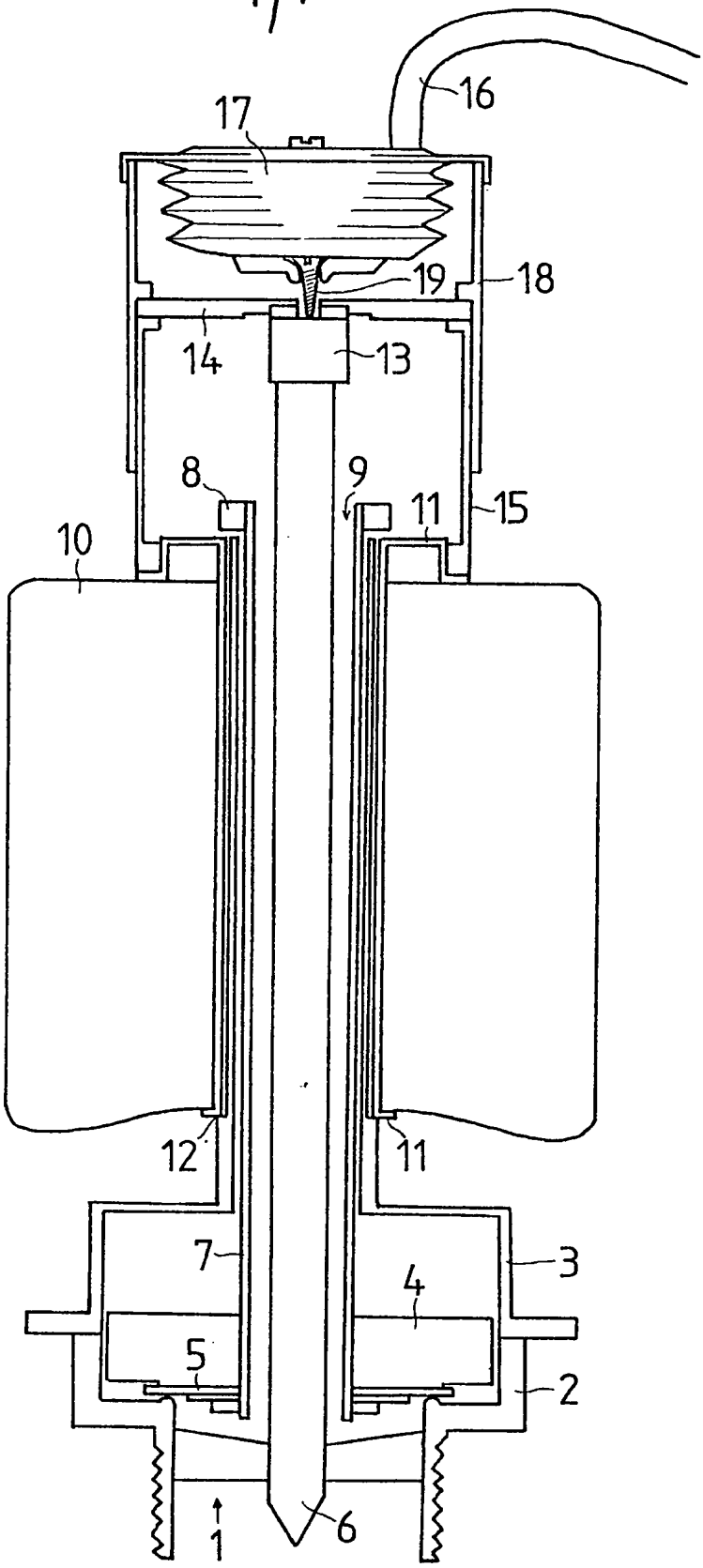

SPECIFICATION

Fluid control valve

This invention relates to fluid control valves and has as its object the provision of a fluid control valve which can be remotely or manually operated to flush a cistern.

The invention provides a fluid control valve comprising a biassing means urging the valve to one of the open and closed positions, a restraining means restraining the valve from opening or closing under the urging of the biassing means, and a control operable to release the restraining means and allow the valve to open or close under the urging of the biassing means.

The biassing means may be a float arranged to open or close the valve under buoyant force. The restraining means may conveniently be a magnet restaining, for example, a float from rising sufficiently to open or close the valve until its hold is broken by the control.

The control may be arranged to be operated remotely of the valve. For example, the control may include a pneumatic duct which operates a pneumatic transducer to operate the valve. Such a transducer may, for example, be a pneumatically expandable bellows which is arranged to exert a force to release the restraining means, for example to separate a ferro-magnetic body and a magnet. The valve may, for example be used to control a cistern in a public facility in which a pneumatic signal is generated by the entry of a person into the facility or the use by a person. For example, the valve may be operated by the opening or closing of a door or a pressure plate in a floor or grating.

A preferred construction of this invention yields a valve which is especially suitable for use as both a manual and an automatic valve, for example a valve which is capable of reacting both to a pre-set level of a fluid in a cistern to open or close an outlet of the cistern, and to an overriding control. Such automatic operation may be provided by including a float in the valve.

One embodiment of the invention is hereunder described, by way of example only, with reference to the accompanying drawing which is a partially-sectioned elevation of a flush cistern valve.

This valve is intended to provide flushing of a cistern on demand under the control of a pneumatic duct. Such a pneumatic duct may be pressurised by means which are responsive to the opening or closing of a door, or a floor pressure plate, or a manually or pedally operated button or lever. Thus, the valve is suitable for controlling the cistern of a public convenience which should flush whenever the convenience is used.

In this embodiment, an outlet passage 1 of the cistern is formed by a conventional cistern valve seat 2 and a housing 3, the seat being perforated in accordance with conventional practice to provide for the outflow of water from the cistern. A valve body 4 which includes a sealing washer 5 is able to rise and fall relative to the valve seat 2 to open the valve or, as illustrated in the drawing, to form a valve-closing seal with the valve seat. This, also, is in accordance with known practice. The major part 4 of the valve body may be hollow, if desired, in accordance with conventional practice.

The valve housing and body differ, however, from conventional flush valve construction in that they are annular and surround a central column 6 of the valve, the column being rigidly mounted in the seat and extending vertically upwardly in use. The valve body includes a tubular portion 7 which extends around and along the rod 6 to terminate in a fixed ring 8. As shown in the drawing, the valve housing 3 also extends upwardly and surrounds the tubular portion 7 to locate a float as hereinafter described. A space 9 between the tubular extension 7 and the rod 6 provides an air inlet for the valve and also an overflow.

It will be appreciated that the valve will be opened if a force acting on the ring 8 lifts the tubular body 7 relative to the rod, thereby lifting the sealing wash 5 relative to the valve seat 2. Such lifting is provided in this embodiment by a float assembly comprising an annular float 10 having an inner wall 11 which slides vertically along the uppermost portion of the housing 3. The float 10 is free to rise so that the inner wall 11 presses upwardly against the ring 8 and lifts the valve washer 5 off the valve seat 2 to open the valve.

The float 10 is subject to an increasing buoyant force as the cistern fills. To restrain the float from opening the valve, the rod 6 is provided at its top end with a magnet 13 and the float 10 mounts a ferro-magnetic disc 14 on a sleeve 15. The magnetic attraction between the magnet 13 and the disc 14 prevents the float 10 from rising relative to the rod 6 and a ball cock or other means controlling the filling of the cistern is set so that the maximum buoyant force on the float is just less than the amount required to break the connection between the disc 14 and the magnet. To break that connection and operate the valve, the valve is provided with a pneumatic hose 16 which communicates with a polyvinyl chloride bellows 17. When pressure is raised in the pneumatic duct 16, the bellows 17 is expanded. The bellows 17 is mounted on a cap 18 which fits securely over a sleeve 15, and is fixed by means such as a bayonet connection, and the bellows is provided with a needle, rod or screw 19 which presses downwardly on the top of the rod 6 ≤;in this case the magnet 13≤)as the bellows 17 expands and may be of adjustable length to adjust the sensitivity of the pneumatic control. Since the rod 6 is unmovable, expansion of the bellows has the effect or lifting the cap 18 relative to the rod. Since the cap 18 is firmly engaged with the sleeve 15 this breaks the connection between the disc 14 and the magnet and the float is free to rise and lift the ring 8 and thereby open the valve. The sleeve 15 is preferably engaged with the float by a bayonet fitting. Once the valve is so opened, if the major portion 4 of the valve body is a float in accordance with conventional practice, the valve will remain open until the cistern is substantially empty at which point the valve will reseat to allow the cistern to refill.

The strength of the magnet 13 and the level of water in the cistern when full may be selected so that the amount of further force required to break hold of the magnet is very small. A conventional pneumatic bellows, for example of the dome type, is easily able to exert that small additional force.

It will be appreciated that various other kinds of control on demand may be provided, for example electrical or mechanical control, provided that the result is to release the float to lift the tubular sleeve 7 of the sealing body.

The cistern may be provided with a supplementary filling means such as a metering valve which overfills the cistern very slowly, for example at night, so that periodically the buoyant force on the float is sufficient to break the hold of the magnet without operation of the manual control. Thus automatic as well as manual operation may be provided.

As well as providing convenient remote control, the embodiment described also contributes greatly to saving of water because it dispenses with the need for frequent automatic flushing in public conveniences during the hours of greatest use.

CLAIMS

1. A fluid control valve comprising a biassing means urging the valve to one of the open and closed positions, a restraining means restraining the valve from opening or closing under the urging of the biassing means, and a control operable to release the restraining means and allow the valve to open or close under the urging of the biassing means.

2. A fluid control valve according to claim 1, wherein the biassing means comprises a float which is arranged to open or close the valve under buoyant force.

3. A fluid control valve according to claim 1 or claim 2, wherein the restraining means comprises a magnet.

4. A fluid control valve according to any preceding claim, wherein the control comprises a pneumatic transducer.

5. A fluid control valve according to claim 4, wherein the control includes a sensor operable by the opening or closing of a door.

6. A fluid control valve according to claim 4, wherein the control includes a sensor which is operable by pressure on a floor surface.

7. A fluid control valve according to any preceding claim, wherein the valve comprises a sealing body which is arranged to move between a position in which it opens the valve and a position in which it closes the valve, the sealing body surrounding a rod-like body which extends in the direction of such movement.

8. A fluid control valve according to claim 7, wherein the biassing means comprises a float which surrounds the rod-like body and is movable relative thereto in the direction of the said movement of the sealing body.

9. A fluid control valve according to claim 8, wherein the restraining means is arranged to restrain the float against movement relative to the rod-like body.

10. A fluid control valve according to claim 9, wherein the restraining means comprises a magnet and a ferro- magnetic body.

11. A fluid control valve having its parts constructed, arranged and adapted to operate substantially as hereinbefore described with reference to the accompanying drawing.

12. Any novel feature or combination of features described herein.

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